

CLIMATE JOBS - BUILDINGS - NUMBERS & PROGRAM NOTES

WK update 210308

To be read with: spreadsheet of jobs, NEF Green Stimulus report July 2020 (Donal Brown Hanna Wheatley et al), and WK notes on that report 201208

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1. SUMMARY

The spreadsheet accompanying this (and pasted in as fig 1 below) shows:

- a realistic training and recruitment scenario (including new job numbers)
- based on using half the available workforce on AECB building standard target level "deep" retrofit
- with the other half implementing selected measures on a larger number of homes (based loosely on the "shopping basket" of measures in the NEF report) to reach min EPC (C) level
- both modelled to complete in a 10 year implementation programme

The deep retrofit scenario alone could only do 3.8 million homes in that period

The NEF-based scenario could treat all 29m homes in the UK by late 2028

A hybrid scenario, where half the newly trained workforce works on the basket of EPC works and the other half does deep retrofit, would be perfect, and give us over 2 million new site jobs on homes alone by 2030, which could continue till 2050.

Using the NEF assumptions as they stand that would allow by 2030:

1.9m deep retrofits

28.8m EPC works ie more than needed*

and then the entire workforce can move on to upgrading the EPC (C) stock to the higher level, over the following years (1.2m deep retrofits a year from 2031 would achieve 26m total properties at enerPHit or close levels by 2050 ie 90% of existing homes)

**The EPC basket of works is skewed towards heat pumps and PV - I propose to "rebalance" it by adding more insulation draughtproofing and window works which will reduce the numbers achieved each year slightly - see below.*

2. NOTES ON ASSUMPTIONS & METHODOLOGY

(The letters refer to columns in the spreadsheet)

A & B - C ALENDAR & PROGRAM YEARS

I am assuming 2021 is for campaigning and winning the argument and resources, hence "year 0". A ten year program then hits (the end of) 2030. But the clock will start whenever we win the resources.

C - NUMBER OF TRAINERS

There are currently approximately only:

1000 members of the AECB

1000 members of LETI

390 members of the Green Register

250 Passivhaus contractors

and many of these are the same people. And, circumstantially, the total number of people who have taken any course at TGR over last twenty years is in the 3000+ zone; the total number at the Passivhaus conference was 400-500 I think. The Retrofit Academy is currently training "hundreds" of Retrofit Coordinators" who will play an important role but won't substitute for skilled site labour.

There are probably few hundred conservation contractors with some of this specialist knowledge.

I haven't been able to get data on FE construction skills courses which could be significant, however for this exercise I am assuming that the proper retrofit skills are an "add-on". There is also already a known shortage of FE lecturers in construction.

I have therefore taken the figure of 1000 fully expert full-time trainers to start the process. This allows both for the overlap and the fact that most of the above experts are also practitioners.

I've then made the assumption that this number can grow by approx 20% each year.

D - NUMBER OF TRAINED WORKERS

I started this at 500 as an estimate of existing builders with these skills.

For training new people, Malcolm McMahon at the Green Register, a PH level builder who has pioneered training of builders, says currently he would assume:

- 6-9 months to fully train a builder - and that assumes some experience beforehand
- 10 learning-hour course to give a basic introduction

I have assumed 6 months per worker, with groups of 10 taught by each teacher. This means 20 skilled retrofit builders per trainer per year.

E - NUMBER OF WORKERS AVAILABLE OVERALL

Here I have made the assumption that every climate retrofit trained builder can "take on" 3 more untrained and lead them correctly - ie there are 4 workers made available for every one trained. The others would learn on the job. Dr Peter Rickaby from the Retrofit Academy recently corroborated this approximate ratio of 1:4 in a seminar.

(I can't quantify how these recruits could be upskilled to the same level as their "leaders" - that would require a slight increase in trainer numbers which I think would be achievable, but complicates this exercise)

H - NUMBER OF HOMES GIVEN DEEP RETROFITS

This column shows the number of homes receiving a "deep" retrofit based on the AECB Building Standard or (where achievable) PassivHaus EnerPHit standard, if half the available workforce is carrying out this work. The numbers are based on allowing an average of 6 months per home, with a team of 4. That gives you 0.5 homes per worker per year *(see appendix 1 for comparisons)*

I - NUMBER OF HOMES GIVEN EPC WORKS

This column shows the number of homes receiving a carefully limited retrofit, based primarily on carbon cost effectiveness, with a view to maximising short term impact, without blocking future improvements to a higher standard. Again it takes half the available workforce, and is based on the NEF overall assumptions ie: 9 million homes done in 4 years by average of 295,000 workers = 7.5 homes per worker per year, but rounded down to 7 homes per worker per year to allow for a greater proportion of fabric intervention compared with heat pumps and pv. *(see appendix 1 for comparisons)*

J - NUMBER OF NEW ON-SITE CONSTRUCTION JOBS (HOMES RETROFIT)

This presents the data shown in column D (no of workers available overall) by the annual increase/recruitment. The total of just over 2 million over the period is the same in both, except this column excludes the nominal 500 already trained now.

K - NUMBER OF SUPPLY CHAIN JOBS

I've taken the lower multiplier of 0.77 from the NEF report , rounded up.

L - so, a total of 3.6 million new jobs over the course of 10 years, for homes retrofit alone.

3. FROM 2030 ON

The entire workforce could be redeployed to upgrade all the EPC level homes to deep retrofit standards, using their plans of work ("building passports") as a starting point. Because of this preliminary assessment, and the fact that by this point the supply chain and efficiency of build teams

will have improved, I think the number of deep retrofits could now be increased by say 20%, that is 1.2m a year, or 24 million in the remaining period till end of 2050 - ie practically all the existing homes in the UK.

That means nearly every home will be warm comfortable and using around a third of the energy used today! If we pulled that off, along with the other sectors, we could put our feet up a bit, as well as turning to taking carbon out of the atmosphere.

4. OTHER ADVANTAGES OF A MIXED APPROACH - AND CONCLUSION

Doing half deep half urgent/light (and allowing more time for the deep) also means:

- we can learn as we go on both counts and feed that into both spheres
- we can adapt what we do as the climate actually changes
- the proportion of deep/light can be tweaked by review, once we get packages of buildings assessed

This mixed approach allows a comprehensive assault on the state of the nations' building stock, creates a multi-skilled workforce, and remains flexible enough to be adjusted as the situation changes.

FIG 1. JOBS SPREADSHEET PRINTOUT

Sheet1

15/01/21

CLIMATE RETROFIT JOBS – SCALING UP THE NUMBERS

A CALENDAR YEAR	B PROG YEAR	C NUMBER OF TRAINERS	D NUMBER OF TRAINED WORKERS	E NUMBER OF WORKERS AVAILABLE OVERALL	H NUMBER OF HOMES GIVEN ENERPHIT OR AECB LEVEL RETROFIT	I NUMBER OF HOMES GIVEN WORKS TO GET EPC [C+] WITH UPGRADE LATER	J NUMBER OF NEW JOBS IN CONSTRUCTION ON SITE (each yr)	K NUMBER OF NEW JOBS IN SUPPLY CHAIN (0.8)	L
2021	0								
2022	1	1000	500	2000	500	7000	1500	1200	
2023	2	1200	24000	96000	24000	336000	94000	75200	
2024	3	1440	52800	211200	52800	739200	115200	92160	
2025	4	1730	87400	349600	87400	1223600	138400	110720	
2026	5	2080	129000	516000	129000	1806000	166400	133120	
2027	6	2500	179000	716000	179000	2506000	200000	160000	
2028	7	3000	239000	956000	239000	3346000	240000	192000	
2029	8	3600	311000	1244000	311000	4354000	288000	230400	
2030	9	4320	397400	1589600	397400	5563600	345600	276480	
2031	10	5200	501400	2005600	501400	7019600	416000	332800	
2032	11								
2033	12								
2034	13								
2035	14								
TOTALS		5200	501400	2005600	1921500	26901000	2005100	1604080	
TOTAL JOBS									3609180
Please see separate notes on assumptions & methodology for each column WK/CCC 210115									(360000 average a year)

APPENDIX 1 - HOW DO YOU CALCULATE JOBS? A COMPARISON

The commonest way we have seen this done is in "new jobs-for-a-year per £million spent" (or job-years per £million)

So for example Forbes, El-Haram et al 2012 paper "Forecasting the number of jobs created through construction" examines a number of studies, including the use of the Labour Forecasting Tool developed for the Construction Industry Training Board. It concludes that while a figure of 13.3 jobs per £million had been used (for example by Scottish Enterprise) based on an industry-wide average, looking at outcomes down the line a figure of 8.5 jobs per £million was more realistic.

The NEF Green Stimulus paper which informs our own argument above, includes figures which would generate about 9 jobs per £million:

9 million homes done in 4 years by average of 295,000 workers = 7.5 homes per worker per year.

If the average cost of the energy measures is £15,000 (based on limited measures to achieve EPC level C, then that means each worker "costs" (or installs/creates) $7.5 \times £15k = £112.5k$ each year.

In which case £1million gives you just under 9 "job-years"

We have chosen to reduce the "productivity" slightly above (to 7 homes per worker per year) to reflect the more labour-intensive package of work that we would propose. This gives us 9.5 job-years per £million.

Another way is knowledge of how long it takes to do a particular job. This is only possible where the nature of the work is broadly consistent and builders and practitioners can use their experience to gauge output. Thus for "deep" retrofit, where a house may be taken apart and put back together, we have consistent figures suggesting the optimum approach is a team of 4 doing an average of one home every 6 months. I have had this approximate figure from Scots retrofit architect Sarah Lewis (speaking at the PassivHaus conference 2020), John Palmer LETI member and Passivhaus Trust research & policy director, and Malcolm McMahon at the Green Register.

That means one worker can complete on average 0.5 retrofit homes. The figure reflects both the labour intensity of the task, and the difficulty of "rushing" it. With these retrofits having typically come in at around £75,000 a property over the last decade, that gives a "cost" of £37,500 a year per job-year, or 27 job years per £million.

We have chosen to reduce the average spend to £50,000 per home - we believe this will allow an effective whole-house intervention, once we have the process running efficiently - which gives a cost of £25,000 per job-year if the time taken remains the same (this would also mean the workers' pay would need to be extra subsidised, at least initially). These figures give 40 job years per £million.

The figures for deep retrofit illustrate why we have chosen to limit the number of these projects initially. The figures for the lighter package of measures are however consistent with other economic modelling.

<i>Study/source</i>	<i>Job-years per £million</i>	<i>Notes</i>
Scottish Enterprise (in Forbes etc 2012)	13.3	general construction work
Forbes El-Haram et al 2012	8.5	general construction work
NEF 2020	9	targeted retrofit package
WK for CCC	9.5	targeted retrofit package
<i>DEEP RETROFIT</i>		
Lewis, Palmer, McMahon (PHT/GreenRegister)	27	deep retrofit/ enerPHit
WK for CCC	40	deep retrofit/ enerPHit

APPENDIX 2 - WHERE WILL THE WORKERS COME FROM?

The numbers involved look large. However, after much discussion and circulation for comment, I think they are realistic.

In terms of what is needed: we have less time to do more work, and the work is extensive - this is our inherited reality.

And in terms of workers who will be available, who will need jobs.

EXISTING RETROFIT BUILDERS

There are an estimated 160,000 workers currently working on repair maintenance and improvement of buildings. Our premise is that these workers can become part of the NCS programme but will still need the training, or the "leadership" of trained workers. This not only a truth universally acknowledged in construction, it's also corroborated by the pitiful (6%) take up of the Green Homes Grant, in massive part because of the shortage of certified skilled installers.

EXISTING OTHER BUILDERS

Beyond these are the remaining 2 million plus building workers who are currently employed on projects including large-scale roadbuilding, HS2, speculative offices, intense newbuild housing developments in selective market hotspots, and out-of-town shopping. In any serious climate action scenario these sectors will decline, and workers will become available for other work.

OTHER WORKERS LOSING JOBS

But the central premise of the NCS is that it will allow redeployment of workers who become redundant in industries affected by decarbonisation.

It's important that we all recognise the level of change that will be required. To achieve net zero, and then to create a stable and fair world economy which can steadily take carbon out of the atmosphere over the following decades/centuries, will mean more than electrification and retrofit works. It will require a significant shift in the way that we do things: consumer goods will need to be more durable, repairable and shareable; homes will need to include more "coliving" arrangements along with the amenities that make that work; work-related transport will need to be reduced; low/zero carbon leisure will need to become the norm. More people will be involved in growing food and other crops, tending the landscape, repairing things - less people will be involved in making short-lived ephemeral products from oil-plastic or high carbon materials, and far less people in advertising, promoting, fighting over market share etc.

So not only would we expect sectors like fossil fuel extraction and distribution, aviation and car making to decline, there will be - needs to be - a decline in other areas of high carbon production. The Climate Jobs pamphlet overall is based on finding roles for these people, and my point here is that we need not fear an absolute shortage of workers, even though many will need or want to be redeployed to other new sectors like renewable energy, sustainable agriculture, biodiversity management, low-

zero carbon manufacture, and crucially the health, care and education sectors as we manage a just transition.

A note on previous recruitment increases: the NEF points out years where the UK construction workforce has increased by between 110,000 and 150,000. This has been massively facilitated by migrant workers, in particular from eastern and southern Europe. CITB reports note of those UK students who have learned construction skills at FE level (approx 100,000 each year) a big proportion don't go on into the industry, or stay in it. Combine these factors with the unregulated cost-driven nature of the UK industry and you can see why quality control suffers on site. My experience is that the person doing the job is at the bottom of a line of people and usually a long way from specifications and even drawings. Add to this a language problem and you can see why it's hard for builders as well as people who want a good outcome. Our training can take all that - including language -on board and potentially transform the culture of the industry as it becomes normal to do things properly.